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ace C. Porter and F. K. Ovitz, conducted their investigations at the Pittsburgh station while it was under the technologic branch of the Geological Survey, the work being a continuation of the fuel investigations begun several years ago at the Louisiana Purchase Exposition, St. Louis, Mo. The results obtained at that plant showed that the work of determining the fuel values of the coals and lignites in the United States with a view to increasing efficiency in their utilization would be incomplete if it did not include systematic physical and chemical researches into the processes of combustion. Hence in their later investigations the authors carried on such researches, concentrating attention on those lines of inquiry which promised results of economic importance. This bulletin is a report on an investigation of the volatile matter in several typical coals—its composition and amount at different temperatures of volatilization.

UNIVERSITY AND EDUCATIONAL NEWS

THE state legislature of Arkansas has appropriated \$350,000 for the erection of four agricultural schools and \$500,000 additional has been raised by the cities.

At the recent meeting of the board of directors of Washington University it was announced that a research laboratory in connection with the chair of pathology and therapeutics in the dental school has been endowed. A well equipped laboratory will be in thorough working order at the beginning of the annual session, October 1, 1910. Dr. Hermann Prinz, who has filled the chair of dental pathology and therapeutics for the past ten years, has been chosen to take charge of the new laboratory.

At a recent meeting of the board of regents of West Virginia, the College of the State University was discontinued, and a department of medicine in the College of Arts and Sciences was established. This department will, as heretofore, offer the work of the first two years of the medical course, but the university will not award the degree of M.D. to those of its students who complete the last

two years in medicine at certain other colleges, as has hitherto been done. This preliminary medical work will be improved, and may be counted towards the degree of B.S.

At the College of Agriculture of the University of Wisconsin and the Wisconsin Agricultural Experiment Station Dr. Ormond S. Butler has been appointed instructor in horticulture to give his entire time to research work. Dr. Butler received his doctor's degree at Cornell in 1910 where he specialized in plant physiology. Dr. Frank B. Hadley has been appointed assistant professor of veterinary science. Assistant Professor E. R. Jones has been granted leave of absence for the second semester to study soil physics and drainage in this country and abroad. Conrad Hoffmann, assistant in agricultural bacteriology, who has been on leave of absence for a year studying soil bacteriology, in Germany, has returned and is giving a course in soil bacteriology.

MRS. HELEN THOMPSON WOOLLEY is assisting in the department of philosophy of the University of Cincinnati this winter.

DR. W. B. PILLSBURY, of the University of Michigan, has been advanced to a full professorship of psychology.

DISCUSSION AND CORRESPONDENCE

THE MENDELIAN THEORY OF HEREDITY AND THE AUGMENTATION OF VIGOR

TO THE EDITOR OF SCIENCE: One of the most interesting questions in connection with the Mendelian theory of heredity is whether the augmentation of vigor observed in crossing distinct varieties can be explained on the hypothesis of the pure gamete.

The following mathematical treatment of the subject may be of interest to some of your readers.

The most general expression for a Mendelian family breeding true to its mean is

$$(p^2(DD) + 2pq(DR) + q^2(RR))^n$$

for, if the array of individuals obtained by expanding this expression be crossed at random, we get the same expression for the array of offspring generation after generation.

If we take two "breeds" denoted by

$$\{p^2(DD) + 2pq(DR) + q^2(RR)\}^n \quad (a)$$

and

$$\{P^2(DD) + 2PQ(DR) + Q^2(RR)\}^n \quad (b)$$

respectively, and cross them at random, it is not difficult to show that the array of the resulting hybrid offspring is given by

$$\{Pp(DD) + (Pp + pQ)(DR) + Qq(RR)\}^n \quad (c)$$

Now, the mean number of recessive elements in these families is

$$(a) \quad \frac{q^2}{(p+q)^2} \times n$$

$$(b) \quad \frac{Q^2}{(P+Q)^2} \times n$$

$$(c) \quad \frac{qQ}{(p+q)(P+Q)} \times n$$

Thus the mean of (c) is the *geometric* mean of (a) and (b).

Since the geometric mean is always less than the arithmetic mean, it follows that the mean number of recessive elements (of the type (RR)) in (c) is less than the collective mean of the families (a) and (b) treated as one population. Moreover, since the recessive elements are fewer, the aggregate elements of the types (DD) and (DR) must be greater.

If, now, it be assumed that dominance is positively correlated with vigor, we have the final result that the crossing of two pure breeds produces a *mean* vigor greater than the collective mean vigor of the parent breeds.

By similar methods it can be shown that the "inbreeding" of a Mendelian population leads to a decrease in the mean number of elements of the types (DD) and (DR).

I am aware that there is no experimental evidence to justify the assumption that dominance is correlated with a "blending" character like vigor; but the hypothesis is not an extravagant one, and may pass until a better takes the field.

A. B. BRUCE

THE SCHOOL OF AGRICULTURE,
CAMBRIDGE, ENGLAND,
August 27, 1910

THE INHERITANCE OF BODY HAIR

READING a book on South African stories called "By Veldt and Kopje," by William Charles Scully (London, T. Fisher Unwin, 1907), I was struck by a statement which may be of interest alike to anthropologists and students of "Mendelism," and as the book may not have been seen by either, I will quote the passage.

In a chapter on "Kaffir Music," written jointly by Mr. Scully and his wife and originally published in the *Pall Mall Magazine*, incidental mention is made of Madikanè, once reigning chief of the Baca tribe of Bantus, who was killed in battle on December 19, 1824. The Bacas lived on and about the present site of Pietermaritzburg, Natal, until driven into exile by the Zulus or the Amangwanè.

There is some ground for thinking that Madikanè's mother was an European, possibly a waif from one or other of the vessels which are known to have been wrecked on the east coast of southern Africa toward the end of the last century.

All authorities agree that Madikanè was of great stature, that he was light in color, and that his hair and beard were long. It was his habit to carry his snuff-spoon stuck in the hair of his chest. One of the writers has examined a number of his male descendants, and found about *one in every four* with traces of hair on the chest. It is, it may be stated, very unusual to find *any* hair on the body of a Bantu. [The italics are mine.]

JOHN BURTT-DAVY

THE REFORMED CALENDAR AND A UNIVERSAL SABBATH

TO THE EDITOR OF SCIENCE: The reform of the calendar is at present so hopelessly academic, that it may not be amiss to add another thought. The Jewish Sabbath, or seventh day of rest, has been adopted by both Christians and Mohammedans—but with changes of the actual week-day in order to emphasize division.

In the proposed new calendar the old regular recurrence of named-days would be altered by the odd no-day yearly, and the actual Sabbath-succession destroyed, despite the re-